REMARKS/ARGUMENTS

Claims 1-20 are currently pending in the present application. Claims 1-20 were rejected. By this amendment, applicant confirms withdrawal of claims 16-20 without prejudice to filing a continuing application.

Claim 1 is amended by the addition of a the limitation whereby an inert fluid flow is maintained through the reaction chamber during the entire deposition process. Support for this limitation is found on page 13, lines 17-19.

Claim 5 is amended to recite a continuous system pressure of ~ 1 Torr. Support for that limitation is found on page 13, lines 17-19 of the specification.

Claim 14 has been amended to recite a10 second pulse duration. Support for this limitation is found on page 13, lines 29-30.

Claim 21 is added to recite a YBCO/Ca-doped high temperature semiconductor film produced via the invented process. Support for this claim is found on page 6, lines 25-30 and page 7, line 1 of the specification, and page 11, lines 10-16 of the specification. None of the art of record anticipates or suggests formation of such film via atomic layer deposition.

Claims 22 to 25 are added to recite the deposition of an alumina layer. Support for this alumina deposition protocol is found on pages 14-15 of the specification. None of the art of record anticipates or suggests formation of such a layer via atomic layer deposition.

Claim 26 is added to claim a substrate being coated having a width to loop separation distance ratio as high as 10,000. Support for this ratio is found on page 16, lines 17-21.

Applicants submit that such amendments place the claims in condition for allowance.

Applicants' Invention

Applicants' invention is related to a method to improve the manufacture and deposition of complex chemical compounds, such as those necessary for High Temperature Superconductors (HTS). The invention employs atomic layer deposition to

form complex structures through the highly-controlled self limiting deposition of precursor moieties. The invention generates uniform conformal layers on exposed substrates, regardless of the shape of the substrate. When the method is used to coat substrates with HTS materials, the resulting uniform superconductor does not suffer from areas of high resistance ("weak links").

Election Requirement

On September 24, 2007, Examiner Talbot contacted Applicant and presented a restriction requirement. Applicant provisionally elected, without traverse, Examiner's Group I. Group I contains the method claims of the application. By this amendment, Applicant affirms the provisional election. Group II claims are withdrawn; Applicant reserves the right to file a subsequent divisional application to prosecute the presently-withdrawn claims of Group II.

Sec. 112 Rejections

Examiner has rejected several claims under Sec. 112. Applicant respectfully submits that the present amendments to the claims fully resolve Examiner's issues with a number of claims.

Specifically, amendments to claim 6 eliminate ambiguous language and clarifies that it covers those surface coatings that use more than three precursor moieties.

Amendments to claim 7 provide the antecedent basis for the carrier gas element.

The Examiner also rejected claims 1-9 and 11 due to lack of enablement for "vapor deposition processes for coatings other than HTS." Applicant respectfully submits that given the present amendments to claim 1 limiting the process to HTS, these claims are fully enabled.

Lastly, the Examiner rejected claims 1-15 "because the specification, while being enabling for atomic layer deposition, does not reasonably provide enablement for other vapor deposition processes." As amended, claims 1-15 presently cover a method employing atomic layer deposition processes.

As such, Applicant respectfully argues that the Sec. 112 objections have been obviated.

Prior Art Does Not Teach Uninterrupted, Multilayer ALD or forthe Deposition and Reaction of Precursor Moieties

Claims 1, 3-8, 10-13 and 15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Applicant's admitted prior art, as found on pages 1-5 of the Specification ("admitted prior art"). Claim 1, on which all subsequent claims depend, has been amended to more clearly define Applicants' invention. Applicants respectfully submit that the §102(b) rejection of the claims has been overcome and the pending claims are allowable.

Anticipation under 35 U.S.C. §102(b) requires "the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim."[1] Applicants submit that the admitted prior art does not disclose each and every element of claim 1 as now more clearly defined.

None of the art discloses or provides for a continuous, uninterrupted, atomic layer deposition and reaction of more than three precursor moieties wherein a continuous inert fluid stream is maintained through the reaction chamber. Instead, the prior art requires repeated evacuation of the reaction chamber, or the prior art devices are limited to three precursor moieties. See for example, U.S. Pat. No. 6,503,330 awarded to Sneh, et al. on Jan. 7, 2003, Col. 9, Lines 49-56 "the first precursor...forms a volatile molecule... The chamber is purged and, then, followed by an introduction of a second precursor."

As presently claimed, the current invention does not require interruptions during the deposition process. Support for the uninterrupted limitation is found in the Specification, page 13, line 30 - page 14, line 4 ("A pulse of the first precursor moiety can be followed *immediately* by a pulse of the next precursor moiety either from the same fluid stream or from different ingress portals. Each pulse is self-purging.")

Applicant also wishes to note that several of the references cited in the patent application are not suitable prior art references inasmuch as their respective priority dates follow the date of filing of the provisional application in this case. For example,

W. Elam, et al., "Conformal Coating of Ultrahigh Aspect Ratio Anodic Alumina Membranes by Atomic Layer Deposition," Chemistry of Materials (Sep. 9, 2003) was published after the filing of the provisional application on March 12, 2003.

Claim 1 presently claims that the process is to be uninterrupted, and this limitation is not found in any of the admitted prior art. The admitted prior art does is not a proper reference under §102. Applicants respectfully request that the allegedly admitted prior art be withdrawn as a §102 reference.

Niinisto Does not Disclose Chemical Reactions between Moieties

Claims 1-5, 7-9, 11 and 13-15 stand rejected under 35 U.S.C. §102(b) as being anticipated by Niinisto, U.S. Patent No. 6,858,546 (hereinafter "*Niinisto*"). Several of the pending claims are amended to more clearly define Applicants' invention. Applicants respectfully submit that the §102(b) rejection of these claims has been overcome and the pending claims are allowable.

The instant invention as recited in currently amended claim 1, requires maintaining an uninterrupted inert fluid stream through the reaction chamber. This contrasts with Niinisto which requires cycling the reaction atmosphere with moiety, then inert gas, then oxygen source moiety, then inert gas. (See Column 8, lines 30-38.). Furthermore, currently amended claim 5 requires a constant pressure throughout the the reaction zone of ~ 1 Torr. In light of this new limitation, Niinisto does not anticipate claim 1 of the instant invention.

Also, amended claim 1 now provides that any subsequent moiety deposited on the substrate surface will chemically react with the underlying coating. Niinisto, on the other hand, does not teach that such chemical reactions occur *in situ*. This is not surprising inasmuch as Niinisto teaches a method of depositing a particular compound, specifically rare earth oxides, so as to form a thin film *of that particular oxide*.

---

[1] *Lindermann Maschinenfabrik GmbH* v. *American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984) (citing *Connell* v. *Sears, Roebuck & Co.*, 722 F.2d 1542, 220 USPQ 193 (Fed. Cir. 1983).

The goal of the current invention, as presently claimed, is not the formation of uniform films, but rather complex compounds, such as high temperature superconductors.

Exemplary deposition procedures not disclosed by Niinisto of interest to the present invention are covered by the newly added claim 21 and the newly added claims 22 to 25 directed to the formation of multiple layers of alumina. The processes subject to these claims rely on the self-limiting feature of the present invention along with chemical and physical reactions between the deposited moieties.

Suntola Does not Disclose Continuous Fluid or Multiple Reactant Moeities

Claims 1-6, and 8 stand rejected under 35 U.S.C. §102(b) as being anticipated by Suntola, U.S. Patent No. 4,058,430 (hereinafter "*Suntola*"). Independent claim 1 has been amended to better reflect Applicants' invention. Applicants respectfully submit that the §102(b) rejection of these claims has been overcome and the pending claims are allowable.

Applicant respectfully submits that *Suntola* does not teach every element of the present invention, as now claimed. Specifically, Suntola does not suggest maintaining an uninterrupted inert fluid stream through the reaction chamber. Rather, Suntola discloses the need of a vacuum pump to evacuate the reaction chamber between deposition steps. (See Column 5, lines 67 through column 6, lines 1-2). See also amended claim 5 which requires a one Torr continuous pressure level.

In light of the foregoing, Applicants submit that Suntola does not anticipate the invention as now recited in claim 1 and 5. Withdrawal of Suntola as a §102 reference is respectfully requested.

The currently-claimed invention is further differentiated from Suntola. For example, amendments to claim 3 adding steps f-g, demonstrate that the present process can be used to generate complex films involving multiple precursor moieties. *Suntola* suggests that its process can be used to create alternating layers through

atomic deposition. ("two vapor sources are provided for alternately subjecting the substrate..." – Col. 5, lines 50-52) The disclosure of *any* number of *alternating* vapor sources does not disclose the Applicant's system which incorporates a series of different moieties to generate products with complex lattice structures.

An example of the complex structure that can be produced by the process as claimed by the present invention is covered by claim 10. The three layers necessary for high-temperature superconductors cannot be created using the *Suntola* process, given that *Suntola* merely alternates a number of sources. Instead, the instant method introduces distinct precursor compound moieties at specific intervals within the same reaction chamber and in the same inert fluid stream to produce high-temperature superconductor layers.

In light of the foregoing, Applicant requests withdrawal of Suntola as a §102(b) reference.

Claim 21 is added to recite a YBCO/Ca-doped high temperature semiconductor film produced via the invented process. Neither Suntola nor Niinisto anticipate or suggest the process for depositing YBCO/Ca-doped layers as now recited in claim 21.

Neither Suntola nor Niinisto anticipate or suggest the process for depositing alumina layers as now recited in claims 22-25.

An earnest attempt has been made to address the Examiner's rejections contained in the October 11, 2007 Official Action. Applicants submit that the application is now in condition for allowance, and same is respectfully requested. If the Examiner feels that a telephonic interview will expedite allowance, he is respectfully urged to contact the undersigned. Claims 1-16 and newly added claims 21-26 are pending in the application.

Dated: February 6, 2008

Respectfully submitted,

CHERSKOV & FLAYNIK

Michael J. Cherskov
Reg. No. 33,664